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**WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
WASHINGTON**

UNITED STATES DEPARTMENT of AGRICULTURE...SOIL CONSERVATION SERVICE,
and
DEPARTMENT of CONSERVATION STATE of WASHINGTON

Data included in this report were obtained by the agencies named above in
cooperation with the U.S. Forest Service, U.S. Geological Survey, Nation-
al Park Service, and other Federal, State and private organizations.

AS OF
MAY 1, 1964

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Water Supply Outlook Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from advance estimates of the streamflow.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, up to 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

Streamflow forecasts are obtained by a comparison of total or maximum snow accumulation, as measured by snow water equivalent, to the subsequent spring and summer or snowmelt season runoff over a period of years. The snow water equivalent measured in selected snow courses provides most of the index to the streamflow forecast for the following season. More accurate forecasts are usually obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast procedure. Early season forecasts assume average climatic conditions through the snowmelt season.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions. Soil Conservation Service Reports may be secured from Water Supply Forecasting Unit, Soil Conservation Service, P.O. Box 2807, Portland, Oregon 97208.

PUBLISHED BY SOIL CONSERVATION SERVICE

<u>REPORTS</u>	<u>ISSUED</u>	<u>LOCATION</u>	<u>COOPERATING WITH</u>
RIVER BASINS			
WESTERN UNITED STATES	MONTHLY (FEB.-MAY)	PORTLAND, OREGON	ALL COOPERATORS
BASIC DATA SUMMARY	OCTOBER 1	PORTLAND, OREGON	ALL COOPERATORS
STATES			
ALASKA	MONTHLY (MAR.-MAY)	PALMER, ALASKA	ALASKA S.C.D.
ARIZONA	SEMI-MONTHLY (JAN.15 - APR.1)	PHOENIX, ARIZONA	SALT R. VALLEY WATER USERS ASSOC. ARIZ. AGR. EXP. STATION
COLORADO AND NEW MEXICO	MONTHLY (FEB.-MAY)	FORT COLLINS, COLORADO	COLO. STATE UNIVERSITY COLO. STATE ENGINEER N. MEX. STATE ENGINEER
IDAHO	MONTHLY (JAN.-JUNE)	BOISE, IDAHO	IDAHO STATE RECLAMATION ENGINEER
MONTANA	MONTHLY (JAN.-JUNE)	BOZEMAN, MONTANA	MONT. AGR. EXP. STATION
NEVADA	MONTHLY (JAN.-MAY)	RENO, NEVADA	NEVADA DEPT. OF CONSERVATION AND NATURAL RESOURCES - DIVISION OF WATER RESOURCES
OREGON	MONTHLY (JAN.-JUNE)	PORTLAND, OREGON	OREG. STATE UNIVERSITY OREGON STATE ENGINEER
UTAH	MONTHLY (JAN.-JUNE)	SALT LAKE CITY, UTAH	UTAH STATE ENGINEER
WASHINGTON	MONTHLY (FEB.-JUNE)	SPOKANE, WASHINGTON	WN. STATE DEPT. OF CONSERVATION
WYOMING	MONTHLY (FEB.-JUNE)	CASPER, WYOMING	WYOMING STATE ENGINEER

PUBLISHED BY OTHER AGENCIES

<u>REPORTS</u>	<u>ISSUED</u>	<u>AGENCY</u>
BRITISH COLUMBIA	MONTHLY (FEB.-JUNE)	WATER RESOURCES SERVICE, DEPT. OF LANDS, FOREST AND WATER RESOURCES, PARLIAMENT BLDG., VICTORIA, B.C., CANADA
CALIFORNIA	MONTHLY (FEB.-MAY)	CALIF. DEPT. OF WATER RESOURCES, P.O. BOX 388, SACRAMENTO, CALIF.

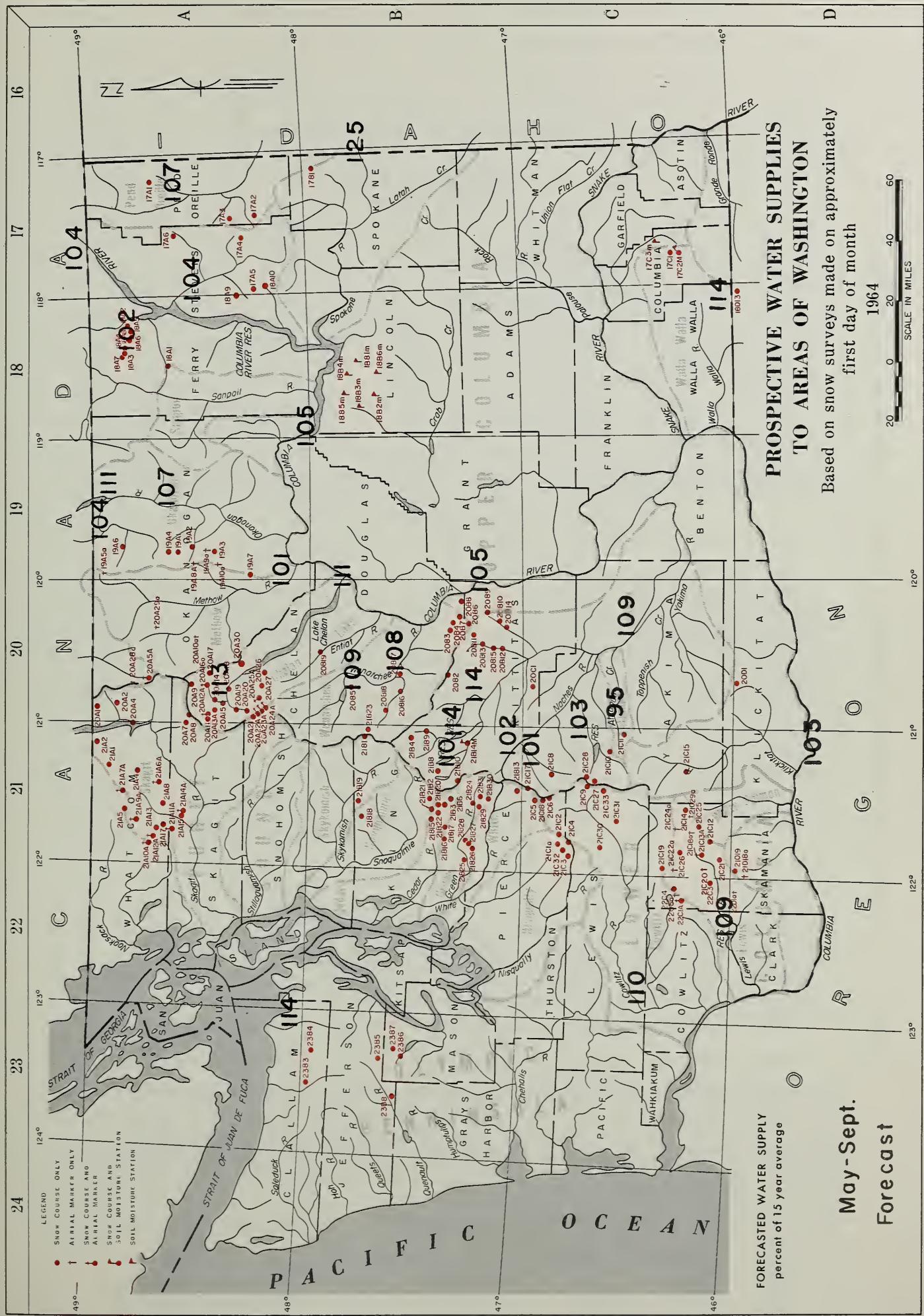
FEDERAL-STATE-COOPERATIVE
SNOW SURVEY AND WATER SUPPLY FORECASTS
For
WASHINGTON

Report Prepared
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Division of Water Resources
Department of Conservation
State of Washington



May - Sept. Forecast

FORECASTED WATER SUPPLY
Percent of 15 year average

SPECIIVE WATER SUPPLIES TO AREAS OF WASHINGTON

Based on snow surveys made on approximately

Forecast

Forecast

A vertical scale bar for a map, labeled "SCALE IN MILES". It features a black horizontal line with tick marks at intervals of 20 miles, ranging from 0 to 60. The label "SCALE IN MILES" is positioned below the 20-mile mark.

|20° |21°

1230

7-0-14887-L

INDEX to WASHINGTON SNOW COURSES and SOIL MOISTURE STATIONS

NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.	UPPER COLUMBIA DRAINAGE					WENATCHEEE RIVER					NAME					NUMBER SEC. TWP. RANGE ELEV.					NAME				
						Boyer Mountain	17A2	7	31N	43E	5250	Blawett Pass	No. 2	20B2	7	26N	15E	2925	Blue Lake	21B2	19	22N	11E	3625	Snoqualmie River	21B2	19	22N	11E	1900
Buncheriss Meadow	17A1	24	37N	44E	5000	Othi-Waukum G. S.	18A3	5	38N	45E	4650	Lake Wenatchee	20B5	4	25N	17E	1810	Bob's Trail	21B21	25	8N	8E	4800	Ollalie Meadows	21B2	26	26N	9E	1900	
Mt. Spokane	17B1	15	28N	45E	4650	Lake Wenatchee R. S.	18A1	26	39N	45E	2970	Leavenworth R. S.	20B17	3	27N	17E	1970	Calumet Ridge	21B1a	8	9N	9E	2500	Council Pass	21B1a	8	9N	9E	4200	
Winchester Creek	17A3	30	33N	43E	2970	Merritt	18A6	3	38N	36E	2150	Stevens Pass	20B18	4	26N	16E	2110	Divide Meadow	21B29a	21	10N	10E	5600	Grand Meadow	21B25	28	8N	9E	3500	
Kettle River						Boulder Road	18A2	26	39N	36E	1450	Butte Creek	18A3	28	39N	35E	4070	Beehive Springs	20B3	35	22N	17E	4270	Lone Pine Shelter	21B26	8	9N	9E	3800	
Cabin Creek						Cabin Creek	18A3	5	38N	36E	3170	Scout-A-Vista	18A2	26	39N	35E	3295	Squillchuck Creek	20B4	18	21N	20E	3400	Mudpie Mountain	22B5a	24	8N	9E	2200	
Goat Creek						Snow Capa Creek	18A5	26	39N	35E	2150	Show Capa Trail	18A7	20	39N	35E	4500	Stemilt Creek	20B8	34	21N	20E	4450	Beaver Creek Trail	21A4	35	39N	12E	2200	
Summit G. S.						Summit G. S.	18A7	20	39N	35E	4500	Jump-Off	18A7	20	39N	35E	4500	Stemilt Slide	20B6	30	21N	20E	4500	Beaver Pass	21A1	9	39N	12E	2680	
Baird						Upper Wheeler	17A6	19	36N	42E	3215	Crab Creek	18A1	24	32N	38E	2885	Creston-Kunz	18B1m	32	27N	34E	2440	Oldman Pass	21B19	26	8N	9E	3600	
Carlson						Govan	17A1	11	32N	41E	4925	Govan	18B2m	20	26N	32E	2050	Mosquito Meadows	18B2m	22	6N	7E	4100	Plains of Abraham	20A4	34	38N	16E	5900	
Cheewelah						Jack Woods	17A5	26	31N	38E	4930	Krause	18A10	6	29N	38E	3370	Sheefalls	18B2m	28	27N	31E	2750	Smith Creek Road	21B2a	35	9N	9E	3500	
Stranger Mountain						Wheatridge	18A3	32	40N	18E	4300	Fish Lake	19A3	18	35N	24E	4000	Spencer Meadow	18B2m	21	19N	20E	4123	Rocky Creek Trail	21A2	14	40N	14E	5000	
Togo						Green Lake	19A2	33	37N	24E	4500	Grouse Camp	19A10a	15	35N	23E	4750	White Pass	18B2m	17	27N	32E	2378	Lake Horowitz	21B22a	16	8N	9E	3400	
Sherman Creek Pass						High Creek	19A10a	20	36N	23E	7000	High Creek	19A1	19	37N	24E	5750	White Pass (East Side)	18B6m	24	25N	32E	2290	White Pass Diversion	21B29a	14	30N	14E	2600	
Clark						Lake Cle Elum	19A6	30	39N	25E	2845	Manum	19A6	30	39N	25E	2845	White Pass (Leach Lake)	18B6m	26	12N	13E	6000	Walter's Flat	21B13	13	15N	8E	3250	
Huckemack Creek						Naanashash	19A1	19	37N	24E	6000	Tunnel Avenue	19A5	7	37N	18E	7000	White Pass (Leach Lake)	18B6m	20	19N	20E	5385	White Pass (new)	21C16	3	13N	8E	3250	
Mutton Creek No. 1						Walters Flat	19A4	19	37N	24E	6000	Walters Flat	19A5	15	40N	23E	7000	White River Entrance	19A5	22	20N	19E	4500	Three Mile Creek	21A15	18	36N	9E	1600	
Paysetayn Creek						White Pass	19A28a	32	40N	18E	4300	White Pass	19A3	18	35N	24E	4000	Williams Creek	19A6	24	25N	32E	2290	Watson Lakes	21A8	25	37N	9E	4500	
Rusty Creek						White Pass	19A3	18	35N	24E	4300	White Pass	19A10a	15	35N	23E	4750	Yakima River	21C11	26	12N	14E	3100	Yakima River	21C11	15	16N	10E	5300	
Salmon Meadows						White Pass	19A10a	20	36N	23E	7000	White Pass	19A10a	20	36N	23E	7000	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Starvation Mtn.						White Pass	19A10a	20	36N	23E	7000	White Pass	19A10a	20	36N	23E	7000	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Touts Coulee						White Pass	19A10a	10	38N	20E	6400	White Pass	19A10a	10	38N	20E	6400	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Billy Goat Pass						White Pass	19A10a	8	39N	20E	6400	White Pass	19A10a	8	39N	20E	6400	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Dollar Watch						White Pass	19A10a	7	37N	18E	6500	White Pass	19A10a	7	37N	18E	6500	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Harts Pass						White Pass	19A10a	15	40N	23E	7000	White Pass	19A10a	15	40N	23E	7000	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Horseshoe Basin						White Pass	19A10a	36	34N	23E	6450	White Pass	19A10a	36	34N	23E	6450	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Loup Loup						White Pass	19A10a	37	34N	16E	6500	White Pass	19A10a	37	34N	16E	6500	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Agnes Creek						White Pass	19A10a	1	31N	15E	5400	White Pass	19A10a	1	31N	15E	5400	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Bridge Creek						White Pass	19A10a	20	34N	16E	2100	White Pass	19A10a	20	34N	16E	2100	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Bullion Creek						White Pass	19A10a	2	33N	16E	1160	White Pass	19A10a	2	33N	16E	1160	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Cloudy Pass						White Pass	19A10a	12	31N	15E	6500	White Pass	19A10a	12	31N	15E	6500	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Cottonwood						White Pass	19A10a	10	34N	14E	2500	White Pass	19A10a	10	34N	14E	2500	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Dagger Lake						White Pass	19A10a	7	34N	16E	5200	White Pass	19A10a	7	34N	16E	5200	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Greenwood Flat						White Pass	19A10a	3	31N	16E	3540	White Pass	19A10a	3	31N	16E	3540	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Little Meadows						White Pass	19A10a	8	31N	16E	5275	White Pass	19A10a	8	31N	16E	5275	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Lyman Lake						White Pass	19A10a	18	34N	16E	6000	White Pass	19A10a	18	34N	16E	6000	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Park Creek Flat						White Pass	19A10a	18	34N	16E	6000	White Pass	19A10a	18	34N	16E	6000	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Park Creek Ridge						White Pass	19A10a	7	34N	16E	4600	White Pass	19A10a	7	34N	16E	4600	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Pass Creek						White Pass	19A10a	20	33N	16E	2500	White Pass	19A10a	20	33N	16E	2500	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Petersons Pass						White Pass	19A10a	21	34N	17E	4780	White Pass	19A10a	21	34N	17E	4780	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Rainy Pass						White Pass	19A10a	22	31N	20E	6000	White Pass	19A10a	22	31N	17E	6000	Yakima River	21C11	32	15N	7E	4100	Yakima River	21C11	32	15N	7E	3600	
Safety Harbor						White Pass	19A10a	14	31N	17E	3015	Satus Pass	19A20	14	31N	17E	3015	Yakima River	21C11	32	15N	12E	3000	Yakima River	21C11	32	15N	9E	3000	
Seven Mile						White Pass	19A10a	16	31N	18E	2020	West Fork Cabin	19A26	14	31N	17E	2020	Yakima River	21C11	32	15N	12E	3000	Yakima River	21C11	32	15N	9E	3000	
Tow Nite						White Pass	19A10a	17	31N	18E	2020	West Fork Cabin	19A27	16	31N	18E	2020	Yakima River	21C11	32	15N	12E	3000	Yakima River	21C11	32	15N	9E	3000	
Brief						White Pass	19A10a	24	28N	19E	1600	Cultus Creek	20B19	24	28N	19E	1600	Yakima River	21C11	32	15N	14E	4200	Yakima River	21C11	32	15N	14E	4200	

LEGEND NUMBERING SYSTEM EXAMPLE

21A7 SNOW COURSE ONLY

21A8 AERIAL MARKER ONLY

21A9 SNOW COURSE AND AERIAL MARKER

21A10 SNOW COURSE AND SOIL MOISTURE STATION

WATER SUPPLY OUTLOOK

State of Washington
May 1, 1964

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* The water supply outlook for irrigation and power in the State of *
* Washington continues to be good. The weather picture over the Col- *
* umbia Basin as a whole has been cold during the month of April *
* which has retarded snowmelt and added water to the snowpack at both *
* low and high elevations. Forecasts of streamflow have generally *
* been improved over that which was reported last month. This is a *
* result of the lack of runoff during the month of April as well as *
* the improved snow picture in the hills. Reservoir storage contin- *
* ues to be low and some reservoirs have been pulled down farther due *
* to the start of the irrigation season. It is still anticipated *
* that all reservoirs will fill with the spring runoff.
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

COLUMBIA MAINSTEM

The Columbia River forecast is for a flow as measured at Birchbank of 42,000,000 acre feet during the May-September period, or 4% greater than normal. At Grand Coulee for the same period it is expected to be 63,800,000, or 5% greater; below Priest Rapids Dam, 72,300,000, also 5% greater; and at The Dalles, Oregon, 95,000,000, or 3% greater than normal. May-June flows for the Columbia at The Dalles is expected to be 60,500,000 acre feet, or 4% greater than normal. River flows during the month of April were only 69% of normal at this station.

PEND OREILLE-SPOKANE RIVERS

Snow courses on the Pend Oreille continue to show well above normal water equivalents and a couple of new courses in the Spokane River showed an increase over that which was measured on the first of April. This is generally not prevalent in this interior mountainous area but because of the cold weather during the month of April it is understandable. Several of the precipitation stations in this area reported well above normal amounts during the month of April and one station for the winter has measured 500% of normal.

The flow of the Pend Oreille was only 58% of normal during the month of April and the Spokane 76%. Forecasts of these streams are expected to be above normal and improved over that which was reported last month. During the May-September period the Pend Oreille is expected to flow 15,200,000 acre feet or 7% greater than normal and the Spokane 2,650,000, or 25% greater. Precipitation over the watershed as a whole was slightly better than normal for the first time since last fall.

COLVILLE-KETTLE RIVERS

In the Colville-Kettle drainages there is only one snow course that has records in excess of three years and this course, in Canada, has a water equivalent well above that which was measured in 1963 and 1962 and also its average. When comparing the other snow courses to their records of the last two years, those that had a snowcover are considerably better than that which occurred in either 1963 or 1962.

Runoff of the Kettle River during the month of April was only 54% of normal and precipitation during the month was below normal as it has been all winter.

The forecast of the Kettle River as measured near Laurier for the May-September period is for a flow 1,700,000 acre feet, or 2% above normal. The Colville River as measured at Kettle Falls is expected to have a flow during the same period of 106,000 acre feet or 4% greater than normal.

OKANOGAN-METHOW RIVERS

The outlook for irrigation and water supply in the Okanogan watershed continues to improve over that which was reported last month. Snowpack in the northern portion of the basin in Canada has improved even more than that which was reported last month and river flows from Canada were well below normal. The irrigation picture on the Methow River, while still good, is not as good as that which is expected on the Okanogan but still above normal.

Inflow to Salmon Lake and Conconully Reservoir on Salmon Creek is now expected to be 14,000 acre feet or 61% of its 23,000 acre feet normal. If this inflow occurs, it will be the same as that which occurred last year during the April-July period. Forecast of the Similkameen as measured near Nighthawk is for a flow 1,590,000 acre feet, or 4% greater than normal for the May-September period. The Okanogan at Oroville is expected to flow 740,000 acre feet, or 11% greater than normal for the same period. The combined flow of these rivers as measured near Tonasket is expected to be 1,890,000 acre feet, or 7% greater for the same period. The Methow River as measured near Pateros is expected to flow 1,050,000 acre feet or 1% greater than normal. For the Methow this is a reduction of 3% from that which was reported last month.

Valley precipitation during the month of April was below normal and for the spring months well below. This is similar to that which has occurred since December 1963.

WENATCHEE-CHELAN-ENTIAT RIVERS

The irrigation outlook for these watersheds continues to improve over that which was reported last month. The snowpack in the Chelan Lake Basin is measured by only one snow course and this course is well above its 13-year average. On the Entiat River there is only one low

elevation course which reported no snow as it has during the last three years. There are three courses on the Wenatchee River with sufficient years of record to be used in computing a normal and these all had well above normal snowpacks. The other courses with shorter records when compared to the last couple of years, indicate a snowpack considerably greater than 1963 and 1962. The Stemilt Basin drainage with five snow courses measured on the first of May indicated no snow where last month they had a good snowpack. Most of the water from this snow, as reported by the local snow surveyors, evaporated or infiltrated because there was very little runoff.

Runoff from the mainstems of the Chelan and Wenatchee were 64% to 66% of normal during the month of April. Precipitation during the month was well below normal as has been reported throughout the fall and winter months.

Forecast for the Chelan River as measured at Chelan is for a flow of 1,300,000 acre feet or 11% greater than normal for the May-September period. The Stehekin River is expected to flow 925,000 or 13% greater than normal for the same period. The Wenatchee at Plain is expected to flow 1,300,000 or 9% greater and at Peshastin, 1,790,000 or 8% greater for the same period. Flow from the Stemilt Basin is expected to be 122,000 miners inches during the May-September period.

YAKIMA RIVER

The outlook for irrigation and water supply continues to improve over the northern portion of the Yakima River watershed but that through the central part, or Naches River drainage, remains about the same as was reported last month, but this is still good. The snowcover over the watershed as a whole is well above normal with the exception of one snow course on the American River drainage and all courses have reported a snowpack considerably greater than was measured in both 1963 and 1962.

Reservoir storage continues to be below normal with considerable draft of the Rimrock Reservoir for irrigation purposes. Streamflow during the month of April was well below normal due to the cold temperatures which reduced snowmelt in the higher Cascades. Precipitation was above normal in the northern portion of the basin and below normal in the Naches drainage.

Forecasts of streamflow which can be found elsewhere in this report range from a low of 5% below normal for the Ahtanum Creek near Tam-pico to a high of 14% above normal for the Kachess River as measured near Easton.

WALLA WALLA RIVER

The outlook for irrigation water supplies for the 1964 season continues to be good for the Walla Walla River watershed as a whole. Forecast of the South Fork of the Walla Walla River as measured near Milton has been reduced slightly from that which was reported last

month but Mill Creek as measured near Walla Walla itself is expected to have a greater flow than that which was anticipated last month.

Flow of the Walla Walla River was only 75% of normal during the month of April and although valley precipitation was below normal, mountain precipitation in the form of snow continued to build up with very little melting. Soil moisture stations both in Oregon and Washington report only small increases over that which was indicated last month.

Forecasts of the South Fork of the Walla Walla as measured near Milton are for flows of 60,000 acre feet and the Mill Creek forecast is 25,000 acre feet for the May-September period, of 14% greater than normal.

LOWER COLUMBIA DRAINAGE

Snow records for the drainages of the Lower Columbia in Washington are generally too short to be used in comparing averages. Most of the snow courses in that area were put in four years ago. The few courses with records going back 11 years indicate a snowpack that is generally greater than normal and all courses indicate a snowpack well above that which was measured in both 1963 and 1962. As a result of this above-normal snowpack and in spite of the lack of precipitation in these drainages, forecasts of both the Lewis and Cowlitz have been increased percentagewise over that which was reported last month.

The Lewis River is now expected to flow 1,100,000 acre feet or 9% greater than normal for the May-September period. The Cowlitz River for the same period is expected to have a flow of 2,400,000 acre feet or 10% greater than normal. Streamflow from the Lewis River during the month of April was near 25% below normal and during the first five days of May, near 40% below normal. Temperatures continue to be very low in this watershed and precipitation falling in the higher elevations is occurring as snow.

PUGET SOUND

Very little information is available for most of the Puget Sound drainages on the first of May but the snow courses that are measured indicate a snowpack that is well above normal at the higher elevations. Low elevation snow courses are not measured but it is anticipated that they too would have above-normal snowcover.

Precipitation along the whole west slope of the Cascades was above normal during the month of April and above normal for the spring period to date. Winter valley precipitation also was below normal in the north and near normal to slightly above in the southwest.

In the northern portion of the basin of the Skagit and Baker Rivers, extensive snow surveys are made and these at all elevations indicate a better than normal snowpack and a well above when compared with both 1963 and 1962. High elevation courses in the Baker River as well as the Nooksack River are thought to be amongst the greatest that have been experienced in the past decade although actual records do not extend back that far.

OLYMPIC PENINSULA

For the first time records were obtained on the snow courses on the Dungeness and Elwha Rivers and Morse Creek as of the first of May. It looks like the snowpack has been depleted from that which was measured on April 1 but not to the extent that could normally be expected. Precipitation at Sequim was reported to be below normal during the past month and temperatures at high elevations were well below normal, resulting in flows of the Dungeness River less than normal. As a result, the forecast of the Dungeness has been increased percentagewise 2%. It is now expected that this river will have, during the May-September period, a runoff of 170,000 acre feet or 14% greater than normal.

STREAMFLOW FORECASTS - MAY 1964

The following summarized runoff forecasts are based principally on mountain snow cover and on the assumption that precipitation and temperature will be near average from the present time to the end of the forecast period. Appreciable deviations from normal of temperature and/or precipitation will correspondingly modify these forecasts.

Basin, Stream and Station	Forecast Runoff 1964	Seasonal Streamflow in Thousands of Acre-Feet					
		% Fore- cast Avg. Period	15-Yr. cast Avg. Period	Measured Runoff 1963	1962	1961	1943-57

COLUMBIA BASIN

Columbia River System

Columbia River

<u>at Birchbank 1/</u>	42000	104	May-Sep	38085	46281	40302
	32700	105	May-Jul	28269	37397	31239
	22250	105	May-Jun	18667	28765	21193

Columbia River

<u>at Grand Coulee 1/</u>	63800	105	May-Sep	54507	65715	60753
	52800	106	May-Jul	43150	55484	49818
	38900	106	May-Jun	31738	45178	36679

Columbia River

<u>bl. Priest Rapids Dam 1/</u>	72300	105	May-Sep	58866	71863	66930
	57700	105	May-Jul	46875	61055	54981
	43000	106	May-Jun	34528	49665	40524

Columbia River

<u>at The Dalles, Ore. 1/</u>	95000	103	May-Sep	76867	77871	91017	92296
	78700	103	May-Jul	61720	62212	77406	76409
	60500	104	May-Jun	46210	47596	64014	58214

Pend Oreille River System

Pend Oreille River

<u>bl. Box Canyon</u>	15200	107	May-Sep	9974	12003	13424	14221
	13700	106	May-Jul	8952	10893	12511	12880
	11250	106	May-Jun	7355	9448	11263	10593

Kettle River System

Kettle River

<u>nr. Laurier</u>	1700	102	May-Sep	1181	1340	1829	1663
	1600	102	May-Jul	1120	1254	1782	1568
	1435	103	May-Jun	980	1117	1695	1396

1/ Observed flow corrected for storage in any of the following reservoirs which are above the station: Kootenay Lake, Hungry Horse, Flathead Lake, Pend Oreille Lake, F. D. Roosevelt Lake, Lake Chelan, Coeur d'Alene Lake, Brownlee, Noxon Reservoir and pumpage at F. D. Roosevelt Lake.

Streamflow Forecasts - May 1964 (Cont'd)

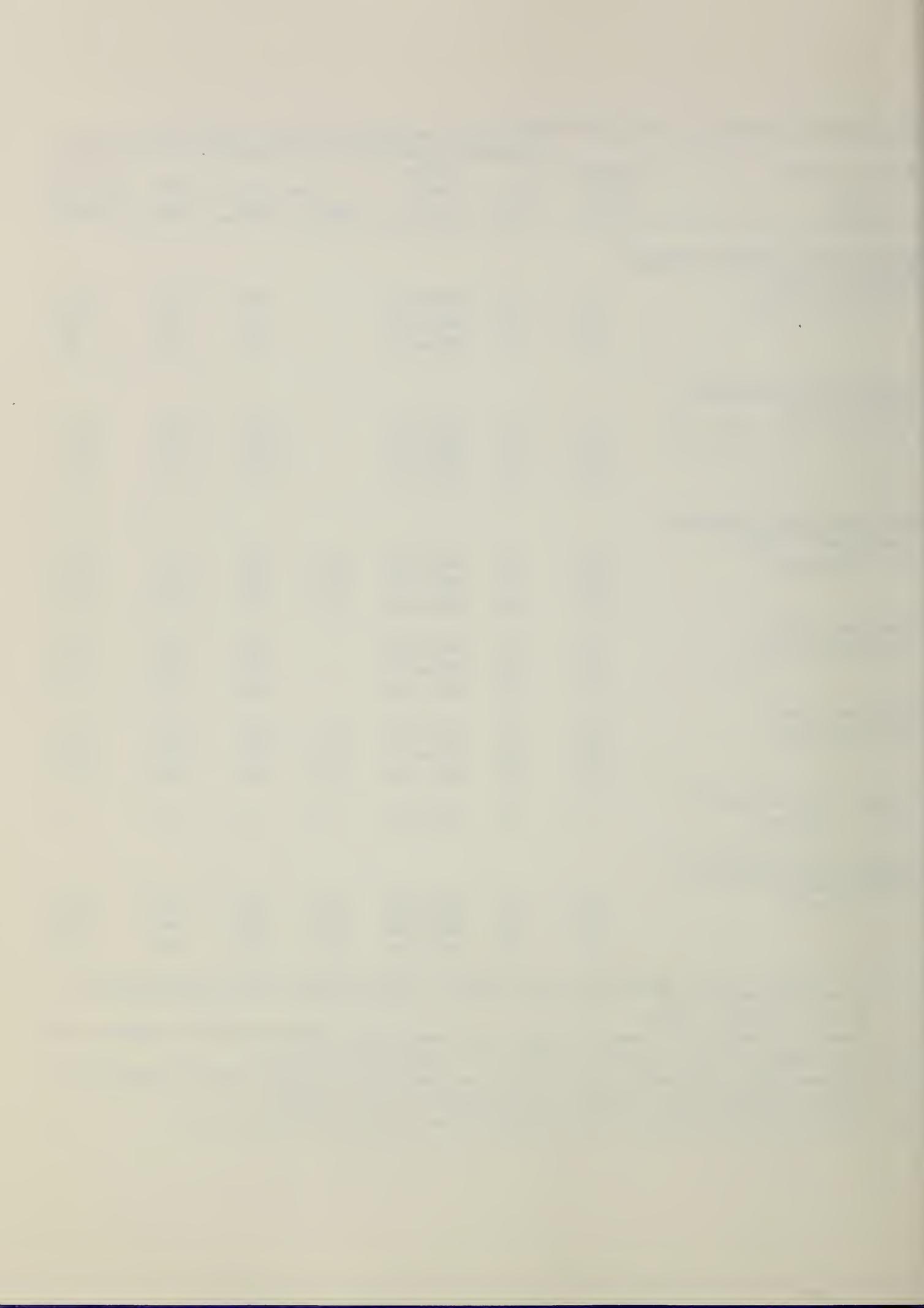
Basin, Stream and Station	Forecast Runoff 1964	Seasonal Streamflow in Thousands of Acre-Feet					15-Yr. Average 1943-57
		% 15-Yr. Avg.	Fore- cast Period	Measured 1963	Runoff 1962	1961	
<u>Kettle River System (Cont'd)</u>							
Colville River at Kettle Falls	106 93 81	104 104 104	May-Sep May-Jul May-Jun	81	161	102	
<u>Spokane River System *</u>							
Spokane River at Post Falls, Ida. <u>2/</u>	2650 2550 2350	125 124 124	May-Sep May-Jul May-Jun	1763 1679 1572	2182 2120 2022	2127 2051 1894	
<u>Okanogan River System **</u>							
Similkameen River nr. Nighthawk	1590 1490 1270	104 105 106	May-Sep May-Jul May-Jun	1140 989 773	992 909 763	1411 1350 1230	1533 1419 1196
Okanogan River at Oroville <u>3/</u>	740 675 615	111 109 110	May-Sep May-Jul May-Jun		590 509 442	601 585 542	669 618 560
Okanogan River nr. Tonasket	1890 1690 1420	107 106 107	May-Sep May-Jul May-Jun	1150 990 766	1084 970 807	1560 1448 1300	1774 1593 1322
Salmon Lake-Conconnelly Res. - Inflow	14	61	Apr-Jul	14	6	16	23
<u>Methow River System **</u>							
Methow River nr. Pateros	1050 970 820	101 101 102	May-Sep May-Jul May-Jun	819 743 624	545 482 395	990 943 857	1037 961 806

* Forecasts made by Morlan W. Nelson and J. Alden Wilson, Soil Conservation Service, Boise, Idaho

** These forecasts are based in part upon base flow data especially prepared and furnished for the purpose by the U. S. Geological Survey.

2/ Observed flow corrected for storage in Coeur d'Alene Lake and diversions by Spokane Valley Farms Company and Rathdrum Prairie Canals.

3/ Observed flow corrected for storage, diversions and evaporation.



Streamflow Forecasts - May 1964 (Cont'd)

Basin, Stream and Station	Forecast Runoff 1964	Seasonal Streamflow in Thousands of Acre-Feet						
		% 15-Yr. Avg.	Fore- cast Period	Measured Runoff 1963	Runoff 1962	Runoff 1961	15-Yr. Average 1943-57	
<u>Chelan River System</u>								
<u>Chelan River</u>								
at Chelan 4/	1300	111	May-Sep	789	1204	1169		
	1140	112	May-Jul	675	1092	1021		
	890	114	May-Jun	500	903	783		
Stehekin River								
at Stehekin	925	113	May-Sep	632	898	818		
	785	113	May-Jul	517	781	694		
	575	113	May-Jun	370	630	508		
<u>Wenatchee River System</u>								
<u>Wenatchee River</u>								
at Plain	1300	109	May-Sep	859	1214	1194		
	1170	109	May-Jul	756	1122	1072		
	900	109	May-Jun	571	943	824		
Wenatchee River								
at Peshastin	1790	108	May-Sep	1183	1652	1649		
	1620	109	May-Jul	1050	1536	1491		
	1250	108	May-Jun	795	1303	1154		
Stemilt Basin								
nr. Wenatchee	122*	--	May-Sep	146*	128*	--		
<u>Yakima River System</u>								
<u>Yakima River</u>								
nr. Martin 5/	145	110	May-Sep	55	75	120	132	
	135	112	May-Jul	50	67	113	121	
	112	111	May-Jun	44	55	104	101	
Yakima River								
at Cle Elum 6/	965	114	May-Sep	457	584	818	847	
	880	114	May-Jul	397	509	757	770	
	740	115	May-Jun	340	420	674	642	
Yakima River								
nr. Parker 7/	1640	109	May-Sep	851	1462	1504		
	1640	110	May-Jul	843	1484	1484		
	1440	110	May-Jun	757	1408	1315		

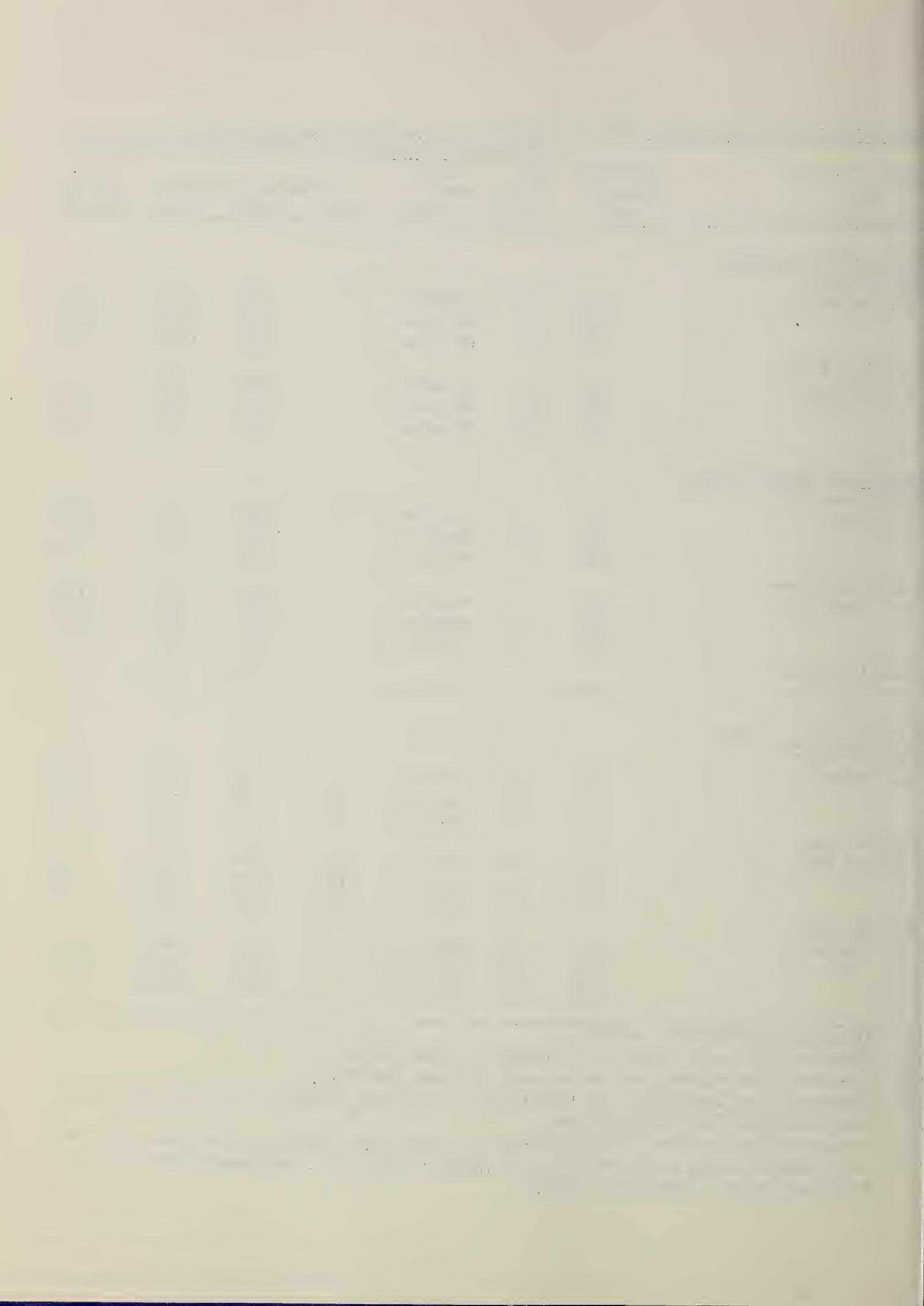
* Thousands of Miners' inches.

4/ Observed flow corrected for storage in Lake Chelan.

5/ Observed flow corrected for storage in Lake Keechelus.

6/ Observed flow corrected for storage in Keechelus, Kachess and Cle Elum Lakes and diversion by Kittitas Canal.

7/ Observed flow corrected for storage in Keechelus, Kachess, Cle Elum, Bumping and Rimrock Lakes and diversions by Roza, Union Gap, New Reservation, Old Reservation and Sunnyside Canals.



Streamflow Forecasts - May 1964 (Cont'd)

Basin, Stream and Station	Forecast Runoff 1964	Seasonal Streamflow in Thousands of Acre-Feet						
		% Avg.	Fore- cast 15-Yr. Avg.	15-Yr. Period	Measured 1963	Runoff 1962	Average 1961	
<u>Yakima River System (Cont'd)</u>								
Kachess River								
nr. Easton 8/	127	114	May-Sep	46	71	105	111	
	121	114	May-Jul	43	65	101	106	
	104	114	May-Jun	40	56	93	91	
Cle Elum River								
nr. Roslyn 9/	495	112	May-Sep	242	312	441	443	
	455	113	May-Jul	212	281	410	404	
	370	113	May-Jun	190	227	357	328	
Bumping River								
nr. Nile 10/	145	101	May-Sep	73	101	149	144	
	135	103	May-Jul	66	90	139	131	
	105	102	May-Jun	58	71	118	103	
American River								
nr. Nile	120	102	May-Sep		81	132	118	
	110	101	May-Jul		73	123	109	
	90	103	May-Jun		57	105	87	
Tieton River								
at Tieton Dam 11/	245	103	May-Sep	144	169	240	237	
	205	103	May-Jul	114	136	201	199	
	160	106	May-Jun	94	98	161	151	
Naches River								
nr. Naches 12/	825	102	May-Sep		544	844	809	
	750	103	May-Jul		471	764	729	
	625	105	May-Jun		375	657	596	
Ahtanum Creeks								
nr. Tampico 13/	40	95	May-Sep	30	30	48	42	
	36	95	May-Jul	27	26	43	38	
	31	97	May-Jun	23	21	38	32	
<u>Lower Columbia River System</u>								
Mill Creek								
nr. Walla Walla	25	114	May-Sep	12	16	18	22	
	20	111	May-Jul	9	12	14	18	
	17	113	May-Jun	7	10	12	15	

8/ Observed flow corrected for storage in Lake Kachess.

9/ Observed flow corrected for storage in Lake Cle Elum.

10/ Observed flow corrected for storage in Bumping Lake.

11/ Observed flow corrected for storage in Rimrock Lake.

12/ Observed flow corrected for storage in Bumping and Rimrock Lakes and diversions by Tieton, Selah Valley, Wapatox Canals and City of Yakima.

13/ Observed flow of North and South Forks (combined).

Streamflow Forecasts - May 1964 (Cont'd)

Basin, Stream and Station	Forecast Runoff 1964	Seasonal Streamflow in Thousands of Acre-Feet					15-Yr. Average 1943-57
		% Avg.	Fore- cast Period	Measured Runoff 1963	Runoff 1962	1961	

Lower Columbia River System (Cont'd)

Lewis River

at Ariel <u>14/</u>	1100	109	May-Sep	676	765	875	1011
	950	111	May-Jul	557	622	732	857
	770	110	May-Jun	466	530	635	703

Cowlitz River

at Castle Rock <u>15/</u>	2400	110	May-Sep	1482	1820	2097	2180
	2050	110	May-Jul	1204	1509	1810	1863
	1650	112	May-Jun	972	1214	1524	1477

OLYMPIC PENINSULA

Dungeness River System

Dungeness River

nr. Sequim	170	114	May-Sep	120	109	175	149
	135	113	May-Jul	92	85	145	119
	95	113	May-Jun	64	59	104	84

14/ Observed flow corrected for storage in Lake Merwin, Yale and Swift Reservoirs

15/ Observed flow corrected for storage in Mayfield Reservoir.

RESERVOIR STORAGE - 1000 Acre Feet

BASIN or STREAM	RESERVOIR <u>1/</u>	USABLE CAPACITY	Measured (May 1)			Normal*
			1964	1963	1962	
<u>COLUMBIA</u>						
Spokane	Coeur d'Alene Lake	889.0	241.9	181.8	371.3	356.7
Columbia	Franklin D. Roosevelt Lake	5232.0	2983.9	2795.0	2662.0	3853.3
Columbia	Banks Lake <u>2/</u>	761.8	---	219.5	430.6	---
Okanogan	Conconully Reservoir	13.0	5.1	6.6	6.6	8.9
Okanogan	Salmon Lake	10.5	9.5	5.5	7.4	9.1
Chelan	Lake Chelan	676.1	121.8	357.9	278.4	251.8
<u>YAKIMA</u>						
Yakima	Keechelus Lake	157.8	74.5	157.0	146.9	108.8
Kachess	Kachess Lake	239.0	172.0	241.2	227.0	196.7
Cle Elum	Lake Cle Elum	436.9	143.1	416.4	400.6	326.6
Bumping	Bumping Lake	33.7	4.6	34.3	32.0	21.7
Tieton	Rimrock Lake	198.0	79.7	198.1	189.2	148.4
<u>PUGET SOUND</u>						
Skagit	Ross Reservoir	1202.9	718.0	1094.9	810.8	290.2
Skagit	Diablo Reservoir	90.6	84.0	86.7	82.9	86.1
Skagit	Gorge Reservoir	9.8	8.2	7.5	8.2	---

1/ Based on Active Storage.

2/ Less than 15-year record in period 1943-57.

* 15-year average 1943-57.

SOIL MOISTURE - MAY

Drainage Basin and Station	Number	Elev.	Profile (Inches) : Soil Moisture Content				
			Depth	Total Capacity	: (Inches) as of May 1		
					1964	1963	1962
<u>CRAB CREEK</u>							
Creston-Kunz	18B1m	2440	48	13.6	10.79	11.00	11.53
Govan	18B2m	2100	48	13.6	11.38	11.91	12.36
Jack Woods	18B3m	2600	48	13.6	9.27	9.99	10.35
Krause	18B4m	2440	48	13.6	9.91	9.55	9.19
Sheffels	18B5m	2360	48	13.6	6.05	7.97	7.06
Wheatridge	18B6m	2200	48	13.6	7.93	8.73	8.14
<u>OKANOGAN</u>							
Trout Creek	3-M	3600	48	7.3	4.37*	3.77*	3.25*
<u>YAKIMA</u>							
Lake Cle Elum	21B14M	2200	48	12.8	9.12	12.30	12.30
<u>WALLA WALLA</u>							
Couse	17C3m	3650	48	11.1	9.63	9.63	10.56
Helmers	17C2M	4400	48	12.0	10.95	11.66	11.40

* April 1 measurement.

FALL SOIL MOISTURE

Drainage Basin and Station	Number	Elev.	Profile (Inches) : Soil Moisture Content				
			Depth	Total Capacity	: (Inches) as of Oct. 1		
					1963	1962	1961
<u>CRAB CREEK</u>							
Creston-Kunz	18B1m	2440	48	13.6	5.12	9.40	4.25
Govan	18B2m	2100	48	13.6	5.79	9.95	5.60
Jack Woods	18B3m	2600	48	13.6	6.75	7.06	7.35
Krause	18B4m	2440	48	13.6	5.23	9.47	4.99
Sheffels	18B5m	2360	48	13.6	3.69	6.69	3.67
Wheatridge	18B6m	2200	48	13.6	4.50	7.49	4.09
<u>OKANOGAN</u>							
Trout Creek	3-M	3600	48	7.3	3.23	2.80	3.00
<u>YAKIMA</u>							
Lake Cle Elum	21B14M	2200	48	12.8	6.63	6.80	9.50
<u>WALLA WALLA</u>							
Couse	17C3m	3650	48	11.1	5.73	7.20	6.60
Helmers	17C2M	4400	48	12.0	5.75	7.60	6.90

PRECIPITATION 1/

Division Averages and Departures

DRAINAGE DIVISIONS	Fall		Winter		Spring	
	Sept.-Nov. 1963 Observed	2/ Departure	Dec. '63-Feb. '64 Observed	2/ Departure	Mar.-April '64 Observed	2/ Departure
Columbia in Canada	6.79	+ 1.02	6.92	- 1.36	2.42	- 0.43
Pend Oreille - Spokane	8.05	- 0.78	9.06	- 2.42	5.85	+ 0.86
Northeastern Washington	5.33	+ 0.11	5.75	- 0.72	2.74	- 0.13
Southeastern Washington	5.60	- 0.30	6.92	- 0.62	3.20	+ 0.03
Central Washington	9.93	- 3.16	16.54	- 4.89	4.92	- 1.71
North Central Washington	3.40	+ 0.21	4.19	- 0.31	0.98	- 0.66
Northwest Slope Cascades	26.46	+ 3.93	31.34	- 0.36	17.70	+ 4.43
Southwest Slope Cascades	16.24	+ 0.57	24.80	+ 0.09	10.08	+ 0.82
Blue Mountains, Oregon	5.02	+ 0.23	5.87	- 1.60	3.17	- 0.32
Lower Columbia in Oregon	4.76	- 0.58	5.61	- 2.38	1.75	- 1.11

Northeastern Washington - Lower Spokane, Colville, Sanpoil and Lower Kettle Drainages.

Southeastern Washington - Touchet, Tucannon and Palouse Drainages.

Central Washington - Yakima, Wenatchee and Chelan Drainages.

North Central Washington - Methow and Okanogan Drainages.

Northwest Slope Cascades - Puget Sound Drainages.

Southwest Slope Cascades - Lower Columbia Drainages.

1/ - Preliminary analysis by U. S. Weather Bureau from data furnished by Meteorological Services of Canada and U. S. Weather Bureau.

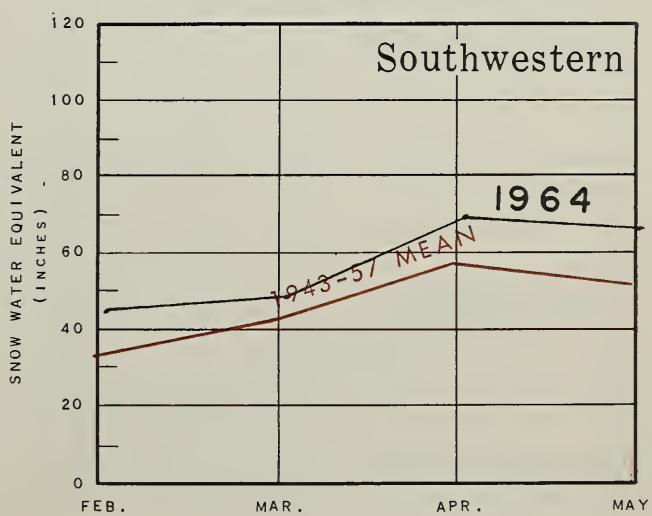
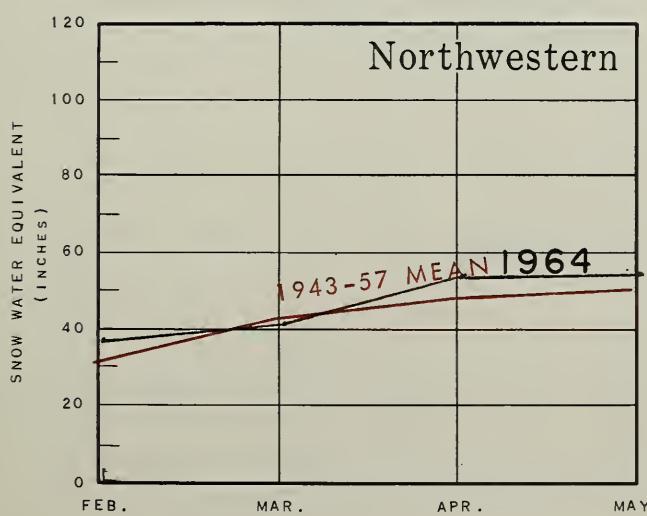
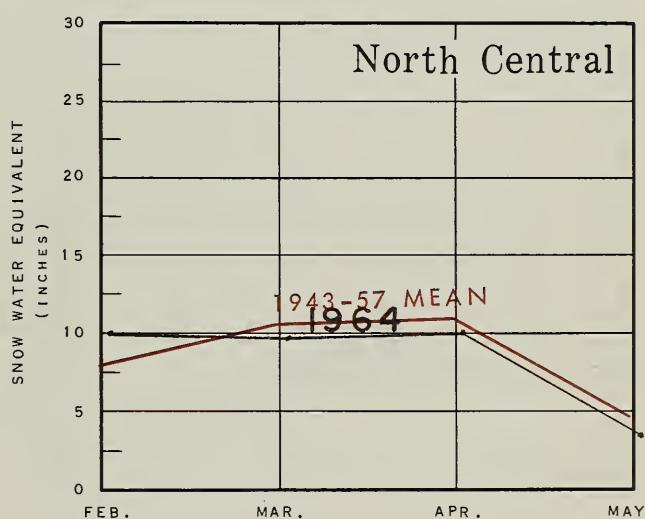
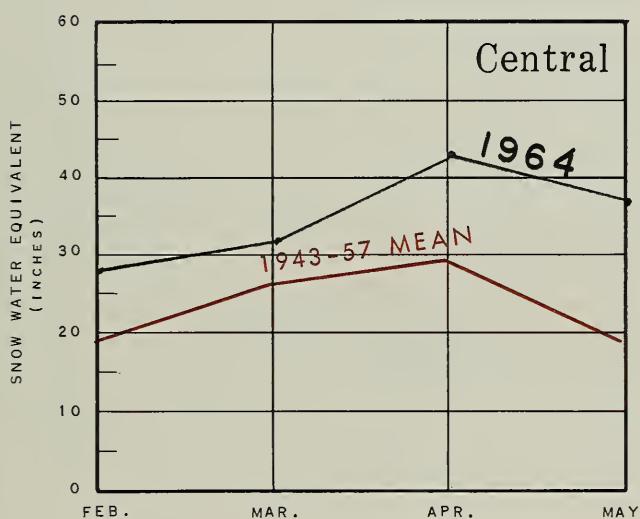
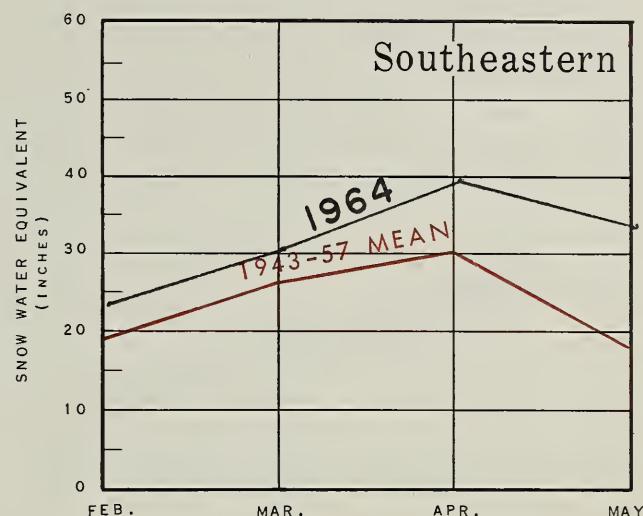
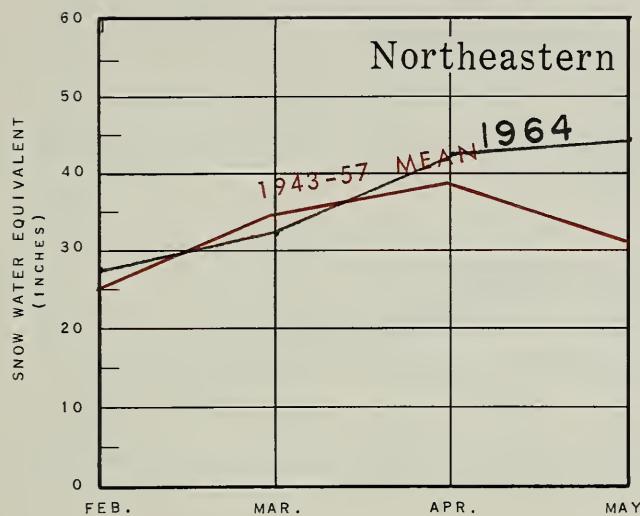
2/ - Departure from 15-year (1943-57) drainage division average.

Note - Precipitation shown in inches.

WASHINGTON SNOW COVER

1964

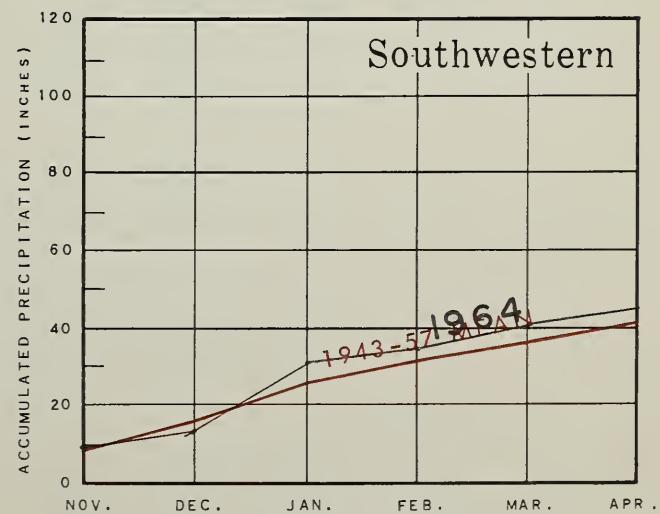
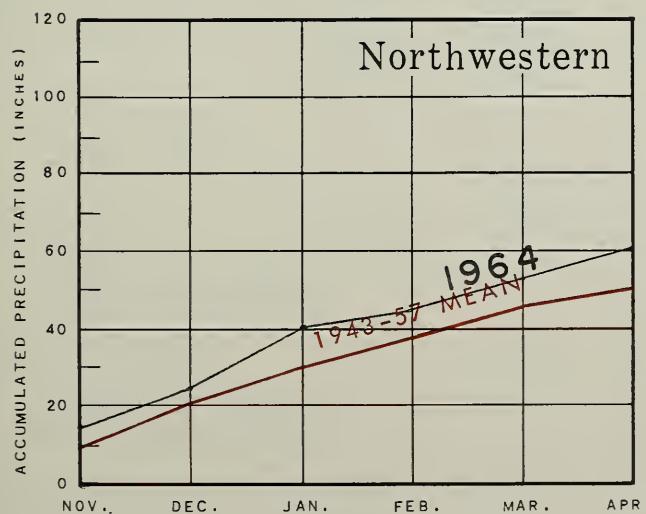
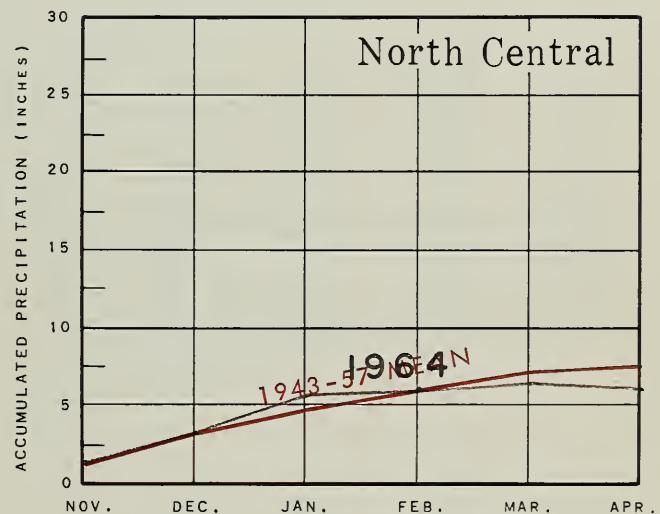
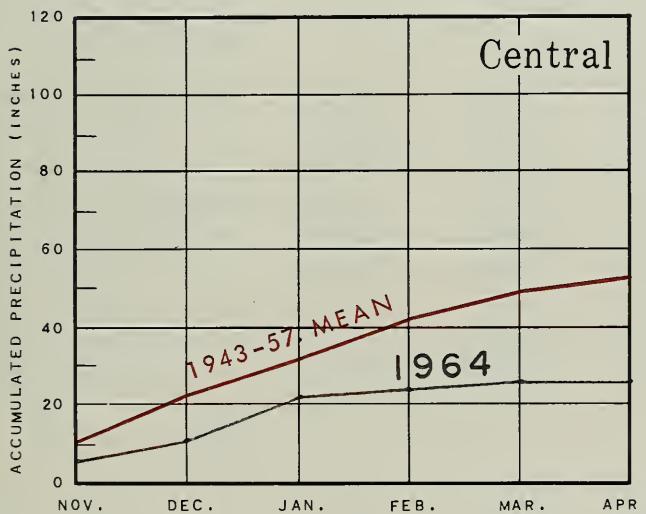
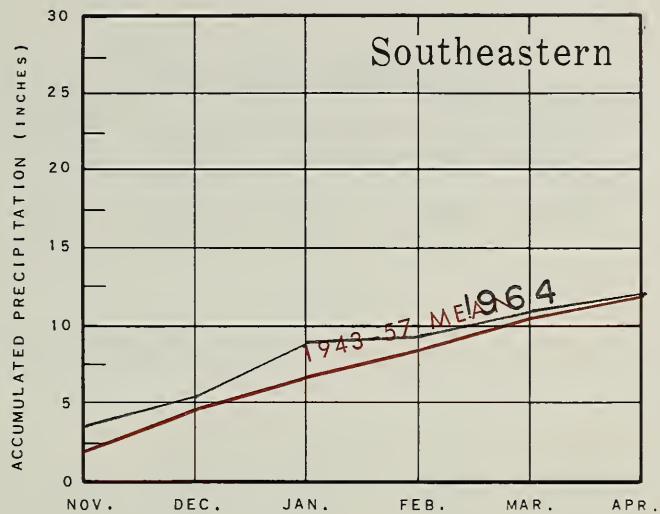
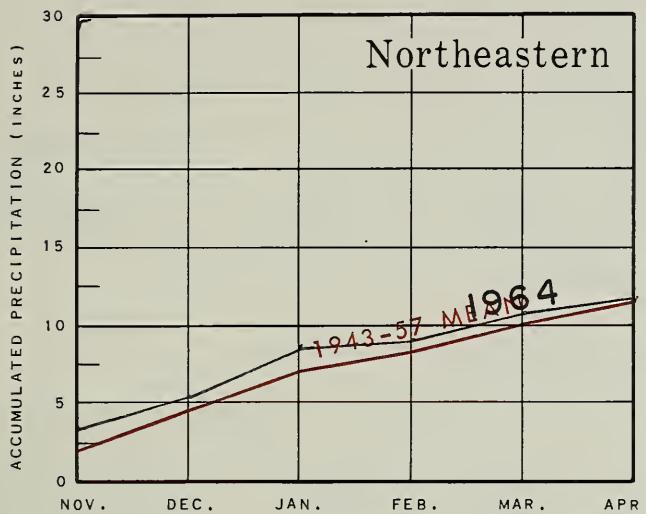
DRAINAGE AREAS



WASHINGTON VALLEY PRECIPITATION

1963 - 1964

DRAINAGE AREAS



APPENDIX 1

SNOW DATA MAY 1, 1964

DRAINAGE BASIN and SNOW COURSE	No.	SNOW COVER MEASUREMENT						
		1964		Past Record				
		Date	Snow	Water	Water Content	(In.)		
		of Depth	Content:				1943-57	
		Elev.	Survey (In.)	(In.)	:1963	1962	Avg.	

MID-MONTH SURVEYS

Snow Surveys made on or about April 15, 1964

WENATCHEE RIVER

Blewett Pass #2	20B2	4270	4/14	36	15.0	0.0	8.8	14.7*
Stevens Pass	21B1	4070	4/15	180	57.9	30.9	45.5	57.0*

YAKIMA RIVER

#Blewett Pass #2	20B2	4270	4/14	36	15.0	0.0	8.8	14.7*
Bumping Lake	21C8	3450	4/14	39	16.1	4.0	9.0	13.8*
Lake Cle Elum	21B14M	2200	4/14	4	1.9	0.0	0.0	3.2*
#Olallie Meadows	21B2	3625	4/13	184	85.2	20.8	39.1	56.5*
#Stampede Pass	21B10	3000	4/14	189	62.2	23.7	39.1	53.6*
Tunnel Avenue	21B8	2450	4/14	77	40.4	2.6	14.4	25.5*
White Pass	21C9	4500	4/15	102	44.7	20.1	27.8	38.6*
White Pass(Ea. Side)	21C28	4500	4/14	78	31.1	13.6	21.4	36.6*
White Pass(Leech Lk.)	21C27	4500	4/15	94	42.2	12.5	23.2	--

COWLITZ RIVER

#White Pass	21C9	4500	4/15	102	44.7	20.1	27.8	38.6*
#White Pass(Ea.Side)	21C28	4500	4/14	78	31.1	13.6	21.4	36.6*
#White Pass(Leech Lk)	21C27	4500	4/15	94	42.2	12.5	23.2	--
Ohanapecosh	21C32	2200	4/15	41	17.5	--	--	--
Pigtail Peak	21C33	5900	4/15	206	96.5	40.4	--	--

GREEN RIVER

Stampede Pass	21B10	3000	4/14	189	62.2	23.7	39.1	53.6*
---------------	-------	------	------	-----	------	------	------	-------

SNOQUALMIE RIVER

Olallie Meadows	21B2	3625	4/13	184	85.2	20.8	39.1	56.5*
-----------------	------	------	------	-----	------	------	------	-------

SKYKOMISH RIVER

#Stevens Pass	21B1	4070	4/15	180	57.9	30.9	45.5	57.0*
---------------	------	------	------	-----	------	------	------	-------

*Adjusted 1943-57 average

#Not directly on this drainage

APPENDIX 2

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT					
			1964		: Past Record			
			Date	Snow	Water	Content (In.)	of Depth Content:	1943-57
				Survey (In.)	(In.)	: 1963	1962	Avg.

Snow Surveys made on or about April 15, 1964 (Cont'd)

BAKER RIVER

Dock Butte +	21A11A	3800	4/17	248	104.2	46.1	56.3	--
Easy Pass +	21A7A	5200	4/17	272	114.2	--	79.2	--
Jasper Pass +	21A6A	5400	4/17	242	101.6	72.9	56.3	--
Marten Lake +	21A9A	3600	4/17	250	105.0	51.1	55.9	--
Mount Blum +	21A18a	5800	4/17	232	97.4	New Course		
#Panorama	21A5	4300	4/15	241	88.9	63.6	65.5	--
Rocky Creek	21A12A	2100	4/17	105	44.1	0.0	10.6	--
Schreibers Meadow +	21A10A	3400	4/17	186	78.1	27.3	41.3	--
S.F. Thunder Creek +	21A14A	2200	4/17	6	2.5	0.0	0.0	--
Watson Lakes +	21A8A	4500	4/17	225	94.5	40.9	45.2	--

NOOKSACK RIVER

Panorama	21A5	4300	4/15	241	88.9	63.6	65.5	--
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* Adjusted 1943-57 average

Not directly on this drainage

+ Snow water equivalent estimated from aerial stadia observations

APPENDIX 3

SNOW DATA MAY 1, 1964

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT				
			1964		Past Record		
			Date of Survey (In.)	Snow Depth (In.)	Water Content (In.)	Water Content (In.)	Avg.

UPPER COLUMBIA DRAINAGEPEND OREILLE RIVER

Baree Creek	15B11	5500	5/1	124	58.8	31.4	41.8	48.2
Benton Meadow	16A2	2344	4/29	0	0.0	0.0	0.0	0.0
Benton Spring	16A3	4900	4/28	48	21.6	7.8	12.0	17.8
Boyer Mountain	17A2	5250	4/27	60	27.9	17.4	23.6	21.3*
Brush Creek	14A4	5000	4/28	33	12.4	8.2	8.4	10.5*
Bunchgrass Meadow	17A1	5000	4/29	69	33.1	22.5	23.4	27.0
Hoodoo Creek	15C1	6200	4/30	126	55.2	35.5	44.5	46.9*
Lookout	15B2	5250	4/28	104	44.3	25.2	30.8	34.0*
Mosquito Ridge	16A4A	5100	Not Measured		--	31.6	33.5	
Nelson	Canada	3050	4/30	32	13.4	0.0	6.2	--
Schweitzer Bowl	16A6	4500	4/29	64	30.6	New Course		
Schweitzer Ridge	16A5	6100	4/29	128	56.2	New Course		
Smith Creek	16A1	4800	4/30	115	56.4	30.7	39.0	46.3*
Winchester Creek	17A3	2970	4/26	0	0.0	0.0	1.5	--

KETTLE RIVER

Barnes Creek	Canada	5300	4/30	60	24.0	17.3	15.9	--
Boulder Road	18A2	1450	4/27	0	0.0	0.0	0.0	--
Butte Creek	18A3	4070	4/27	17	5.2	0.0	5.0	--
Cabin Creek	18A8	3170	4/27	0	0.0	0.0	0.0	--
Carmi	Canada	4100	5/1	0	0.0	0.0	--	--
Farron	Canada	4000	4/30	29	11.9	2.1	8.3	--
Goat Creek	18A4	3595	4/27	0	0.0	0.0	0.0	--
Monashee Pass	Canada	4500	4/30	40	16.3	11.2	11.6	12.4**
Snow Caps Creek	18A5	2150	4/27	0	0.0	0.0	0.0	--
Snow Caps Trail	18A6	2720	4/27	0	0.0	0.0	0.0	--
Summit G. S.	18A7	4600	4/27	22	6.4	2.9	5.8	--

SPOKANE RIVER

Copper Ridge	16B2	4800	4/28	91	44.0	9.0	23.5	27.8
Forty-nine Meadows	15B3	5000	4/28	81	40.0	17.0	24.4	34.2*
4th of July Summit	16B3	3100	4/28	8	3.2	0.0	0.0	--
Granite Peak	15B13A	6000	4/28	122	53.3	New Course		
Medicine Ridge	15B4A	6150	4/28	118	52.7	New Course		

* Adjusted 1943-57 average

** Average for years of record

APPENDIX 4

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT					
			Date of Survey	Snow Depth (In.)	Water Content (In.)	:P a s t R e c o r d		
						1964	1963	1962
								1943-57

SPOKANE RIVER (Cont'd)

#Lookout	15B2	5250	4/28	104	44.3	25.2	30.8	34.0*
Lower Sands Creek	16B1	3400	4/28	62	28.8	2.2	14.1	12.6*
#Mosquito Ridge	16A4A	5110	Not Measured		--		31.6	33.5*
Outlaw	15B12	3750	4/28	39	16.5	0.0	6.2	--

OKANOGAN RIVER

Aberdeen Lake	Canada	4300	4/30	15	3.3	0.0	0.0	1.4**
Blackwall Mountain	Canada	6250	4/30	105	48.4	35.3	27.7	--
Bouleau Creek	Canada	5000	5/2	31	10.5	4.0	7.4	--
Brookmere	Canada	3200	5/3	21	9.1	0.0	1.9	5.6**
Clark +	19A8a	7000	4/29	69	24.2	28.9	--	--
#Freezeout Meadows	20A2	5000	4/28	84	37.1	17.2	14.8	34.1*
Hamilton Hill	Canada	4900	4/30	42	18.0	8.6	5.6	--
#Harts Pass	20A5A	6500	4/30	118	52.8	44.2	36.6	50.2
Lost Horse Mountain	Canada	6300	4/30	42	13.1	7.5	8.2	--
McCulloch	Canada	4200	4/30	14	4.9	0.8	2.8	2.7**
Missezula Mountain	Canada	5100	4/30	30	9.3	0.0	2.6	--
Mission Creek	Canada	6000	4/28	62	23.9	18.4	17.8	21.1**
Monashee Pass	Canada	4500	4/30	40	16.3	11.2	11.6	12.4**
Muckamuck +	19A9a	6390	4/29	48	16.8	22.5	--	--
Mutton Creek No. 1	19A1	5700	4/29	22	8.0	8.0	1.1	8.4*
Mutton Creek No. 2	19A4	6000	4/29	35	12.2	14.1	4.4	13.3*
Nickel Plate Mtn.	Canada	6200	5/1	38	12.1	5.1	7.9	--
Postill Lake	Canada	4500	4/29	21	7.8	3.4	4.4	6.6**
Rusty Creek	19A3	4000	4/29	0	0.0	0.0	0.5	1.2*
Salmon Meadows	19A2	4500	4/29	10	3.2	3.5	1.0	4.0*
Silver Star Mtn.	Canada	6050	4/30	80	32.4	20.0	15.8	22.3**
Starvation Mtn. +	19A10a	6750	4/29	63	22.0	30.4	--	--
Trout Creek	Canada	4700	4/30	20	6.8	2.1	1.8	4.8**

METHOW RIVER

Harts Pass	20A5A	6500	4/30	118	52.8	44.2	36.6	50.2
#Mutton Creek No. 1	19A1	5700	4/29	22	8.0	8.0	1.1	8.4*
#Mutton Creek No. 2	19A4	6000	4/29	35	12.2	14.1	4.4	13.3*
#Rusty Creek	19A3	4000	4/29	0	0.0	0.0	0.5	1.2*
#Salmon Meadows	19A2	4500	4/29	10	3.2	3.5	1.0	4.0*

+ Snow water equivalent estimated from aerial stadia observations

Not directly on this drainage

* Adjusted 1943-57 average

** Average for years of record

APPENDIX 5

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT					
			1964		:Past Record			
			Date of Survey	Snow Depth (In.)	Water Content (In.)	Water Content: 1963	1962	Avg.
<u>CHELAN LAKE BASIN</u>								
Rainy Pass	20A9	4780	4/30	112	51.1	33.2	31.0	44.3*
Safety Harbor	20A30	6300	Late Report					
<u>ENTIAT RIVER</u>								
Brief	20B19	1600	4/26	0	0.0	0.0	0.0	--
<u>WENATCHEE RIVER</u>								
Berne-Mill Creek	21B23	2925	4/29	70	33.7	0.0	6.5	--
Blewett Pass No. 2	20B2	4270	4/30	31	13.5	0.0	2.3	10.7*
Chiwaukum G. S.	20B16	1810	4/29	1	0.4	0.0	0.0	--
#Fish Lake	21B4	3371	4/29	82	37.4	8.4	19.0	27.0*
Lake Wenatchee	20B5	1970	4/29	0	0.0	0.0	0.0	--
Leavenworth R. S.	20B17	1127	4/27	0	0.0	0.0	0.0	--
Merritt	20B18	2140	4/29	10	4.6	0.0	0.0	--
Stevens Pass	21B1	4070	4/29	167	79.2	29.3	39.4	51.0*
<u>SQUILCHUCK CREEK</u>								
Beehive Springs	20B3	4400	4/29	0	0.0	0.0	0.0	1.4*
Scout-A-Vista	20B4	3400	4/29	0	0.0	0.0	0.0	0.0*
<u>STEMILT CREEK</u>								
Jump-Off	20B8	4450	4/30	0	0.0	0.0	0.0	--
Stemilt Slide	20B6	5000	4/30	0	0.0	4.8	0.0	--
Upper Wheeler	20B7	4400	4/30	0	0.0	0.0	0.0	--
<u>YAKIMA RIVER</u>								
Ahtanum R. S.	21C11	3100	4/30	0	0.0	0.0	0.0	0.0*
Big Boulder Creek	21B9	3200	4/29	37	15.9	0.0	0.0	6.8*
#Blewett Pass No. 2	20B2	4270	4/30	31	13.5	0.0	2.3	10.7*
Bumping Lake	21C8	3450	4/29	29	12.8	1.5	4.9	10.5*
Fish Lake	21B4	3371	4/29	82	37.4	8.4	19.0	27.0*
Lake Cle Elum	21B14M	2200	4/29	0	0.0	0.0	0.0	0.6*
Morse Lake	21C17	5400	4/28	143	66.7	43.7	63.0	68.0*
#Olallie Meadows	21B2	3625	4/28	183	87.2	17.3	33.1	51.5*
#Status Pass	20D1	4030	4/28	10	4.7	0.0	0.0	--

Not directly on this drainage

* Adjusted 1943-57 average

APPENDIX 6

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT					
			1964		: Past Record			
			Date of Survey	Snow Depth (In.)	Water Content (In.)	Water Content: 1963	1962	Avg.

YAKIMA RIVER (Cont'd)

#Stampede Pass	21B10	3000	5/1	176	66.1	25.6	34.6	47.4*
Tunnel Avenue	21B8	2450	4/29	70	37.4	0.0	8.9	19.2*
White Pass	21C9	4500	4/28	97	45.2	20.2	24.4	36.9*
White Pass(Ea.Side)	21C28	4500	4/29	75	32.1	14.5	20.3	37.9*
White Pass(Leech Lk)	21C27	4500	4/28	92	42.6	14.1	19.0	--

AHTANUM CREEK

Ahtanum R. S.	21C11	3100	4/30	0	0.0	0.0	0.0	0.0*
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LOWER COLUMBIA DRAINAGE

KLICKITAT RIVER

Status Pass	20D1	4030	4/28	10	4.7	0.0	0.0	--
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WHITE SALMON RIVER

Cultus Creek	21C12	4000	4/30	120	55.4	23.0	43.6	52.1*
#Surprise Lakes	21C13A	4250	4/30	140	63.4	23.9	41.0	55.1*

WIND RIVER

Oldman Pass	21D19	3100	4/29	45	19.6	2.0	0.0	10.2*
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LEWIS RIVER

Blue Lake +	21C22a	4800	4/28	214	92.0	65.2	69.9	--
Bob's Trail	21C21	2200	4/30	29	11.5	0.0	0.0	--
Calamity Ridge +	22D1a	2500	4/28	5	2.2	0.0	0.0	--
Council Pass +	21C18a	4200	4/28	115	50.5	15.9	24.2	--
#Cultus Creek	21C12	4000	4/30	120	55.4	23.0	43.6	52.1*
Divide Meadow +	21C29a	5600	4/28	151	63.5	47.5	55.3	--
Grand Meadow	21C25	3500	4/30	61	25.4	9.5	15.2	--
Lone Pine Shelter	21C26	3800	4/28	115	53.2	23.1	31.4	--
Marble Mountain +	22C5a	3200	4/28	102	50.1	4.8	--	--
New Muddy River	22C6	2000	4/29	0	0.0	New Course		
Oldman Pass	21D19	3100	4/29	45	19.6	2.0	0.0	10.2*
Plains of Abraham +	22C1a	4400	4/28	164	75.4	43.6	61.1	81.6*
Smith Creek Road	22C4	2100	4/29	0	0.0	0.0	0.0	--

+ Snow water equivalent estimated from aerial stadia observations

Not directly on this drainage

* Adjusted 1943-57 average

APPENDIX 7

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT						
			1964		:Past Record				
			Date	Snow of Depth Survey (In.)	Water Content: (In.)	Water Content: 1963	1962	1943-57	Avg.
LEWIS RIVER (Cont'd)									
Spencer Meadow +	21C20a	3400	4/28	58	27.3	0.0	2.0	--	
Surprise Lakes	21C13A	4250	4/30	140	63.4	23.9	41.0	55.1*	
Table Mountain +	21C24a	4200	4/28	118	51.9	27.0	39.2	--	
Timbered Peak +	21D18a	3000	4/28	47	20.7	0.0	0.5	--	
COWLITZ RIVER									
Ohanapecosh	21C32	2200	4/27	28	10.6	--	--	--	
Pigtail Peak	21C33	5900	4/28	209	97.2	45.0	--	--	
Plains of Abraham +	22C1a	4400	4/28	164	75.4	43.6	61.1	81.6*	
#White Pass	21C9	4500	4/28	97	45.2	20.2	24.4	36.9*	
#White Pass(Ea.Side)	21C28	4500	4/29	75	32.1	14.5	20.3	37.9*	
#White Pass(Leech Lk)	21C27	4500	4/28	92	42.6	14.1	19.0	--	
PUGET SOUND DRAINAGE									
WHITE RIVER									
#Morse Lake	21C17	5400	4/28	143	66.7	43.7	63.0	68.0*	
GREEN RIVER									
Stampede Pass	21B10	3000	5/1	176	66.1	25.6	34.6	47.4*	
SNOQUALMIE RIVER									
Olallie Meadows	21B2	3625	4/28	183	87.2	17.3	33.1	51.5*	
SKYKOMISH RIVER									
#Stevens Pass	21B1	4070	4/29	167	79.2	29.3	39.4	51.0*	
SKAGIT RIVER									
Beaver Creek Trail	21A4	2200	4/28	18	8.4	0.0	0.0	8.1*	
Beaver Pass	21A1	3680	4/28	94	41.9	13.7	18.7	37.1	
Devils Park	20A4	5900	4/30	126	55.3	38.4	39.5	45.5*	
Freezeout Cr. Tr.	20A1	3500	4/28	32	13.4	0.8	0.4	11.2*	
Freezeout Meadows	20A2	5000	4/28	84	37.1	17.2	14.8	34.1*	
#Harts Pass	20A5A	6500	4/30	118	52.8	44.2	36.6	50.2	
Lake Hozomeen	21A2	2600	4/28	28	10.4	0.0	0.0	9.2*	

+ Snow water equivalent estimated from aerial stadia observations

Not directly on this drainage

* Adjusted 1943-57 average

APPENDIX 8

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT					
			1964		Past Record			
			Date of Survey (In.)	Snow Depth (In.)	Water Content (In.)	Water Content (In.)	1963	1962
DRA								

SKAGIT RIVER (Cont'd)

Meadow Cabins	20A8	1900	4/30	12	5.1	0.0	0.0	2.4*
#Rainy Pass	20A9	4780	4/30	112	51.1	33.2	31.0	44.3*
Thunder Basin	20A7	4200	4/30	78	34.0	14.1	17.8	29.7*

BAKER RIVER

Dock Butte	21A11A	3800	5/1	228	110.1	46.1	62.1	--
Easy Pass	21A7A	5200	5/3	274	134.4	79.8	77.3	--
Jasper Pass	21A6A	5400	5/3	251	121.0	76.6	82.3	--
Koma Kulshan	21A17	800	5/1	0	0.0	0.0	0.0	--
Marten Lake	21A9A	3600	5/2	236	115.8	48.5	67.4	--
#Panorama	21A5	4300	4/29	236	99.8	62.0	76.8	--
Rocky Creek	21A12A	2100	5/2	80	35.7	0.0	0.0	--
Schreibers Meadow	21A10A	3400	5/2	187	92.3	36.6	52.6	--
S.F. Thunder Creek	21A14A	2200	5/1	11	4.8	0.0	0.0	--
Sulphur Creek	21A13	1600	5/2	33	14.1	0.0	0.0	--
Three Mile Creek	21A15	1600	5/1	0	0.0	0.0	0.0	--
Watson Lakes	21A8A	4500	5/3	206	98.9	44.5	59.8	--

NOOKSACK RIVER

Panorama	21A5	4300	4/29	236	99.8	62.0	76.8	--
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OLYMPIC PENINSULADUNGENESS RIVER

Deer Park	23B4	5200	4/27	63	26.9	--	--	--
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MORSE CREEK

14 Mile Post	23B11		4/27	0	0.0	New Course
Morse Creek	23B12		4/28	132	59.5	New Course

ELWHA RIVER

Hurricane	23B3	4500	4/28	84	35.7	--	--	--
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Not directly on this drainage

* Adjusted 1943-57 average

Agencies Assisting with Snow Surveys

GOVERNMENT AGENCIES

Canada:

Department of Lands, Forests and Water Resources,
Water Resources Service, British Columbia

States:

Washington State Department of Conservation
Washington State Department of Natural Resources

Federal:

Department of the Army
Corps of Engineers
U. S. Department of Agriculture
Forest Service
U. S. Department of Commerce
Weather Bureau
U. S. Department of the Interior
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Bureau of Reclamation
Geological Survey
National Park Service

PUBLIC AND PRIVATE UTILITIES

Chelan County P.U.D.
Pacific Power and Light Company
Puget Sound Power and Light Company
Washington Water Power Company

OTHER PUBLIC AGENCIES

Okanogan Irrigation District

MUNICIPALITIES

City of Walla Walla
City of Tacoma
City of Seattle

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

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